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Mathew J. Breitwisch

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EXAMINER

TRAN, THIEN F

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/711,845
Filing Date: October 08, 2004
Appellant(s): BREITWISCH ET AL.

Frederick W. Gibb, III
For Appellant

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EXAMINER'S ANSWER

This is in response to the appeal brief filed 03/01/2006 appealing from the Office action mailed 10/03/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5469379	LEVY	11-1995
5166556	HSU et al.	11-1992

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Levy (USPN 5,469,379).

Levy discloses an antifuse structure (Figure 2) comprising a fin having a center portion 58 and end portions (55, 60), wherein said center portion of said fin comprises a substantially non-conductive region 58 (insulating amorphous silicon) which is capable of permanently becoming a conductor when heated above a predetermined temperature, wherein said end portions comprise conductors. A "fin" is understood to be a projection that extends from a body and it is quite clear to the examiner that the antifuse structure (layers 55,58,60) of Levy is a projection from a body (substrate 54); therefore, the antifuse structure of Levy is characterized as a fin.

Regarding claim 2, said center portion of said fin comprises an amorphous material.

Regarding claim 3, it is inherent that said center portion of said fin is approximately 10 times more conductive after being heated above said predetermined temperature when compared to conductivity level of said center portion before heating.

Regarding claim 5, the center portion comprises amorphous silicon before transforming into polycrystalline silicon.

The limitations "heated above predetermined temperature" in claims 1, 3 and 5 are functional languages and are nonlimiting since it has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danley, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does". Hewlett-Packard Co. v. Bausch & Lomb Inc., 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). It is noted that a functional statement cannot serve to distinguish a claim, which is not a process claim, from a reference since it does not define any structure. This is particularly so where the functional statement is conditional in nature, as to a possibility that may or may not occur. In re Mason, 244 F.2d 733, 114 USPQ 127 (CCPA 1957). Also, the center portion (link 58) has the same material and is an antifuse layer, it is capable to perform the same function as claimed, to permanently become a conductor when heated above a predetermined temperature.

Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Hsu et al. (USPN 5,166,556).

Hsu et al. discloses an antifuse structure (Figure 2) comprising a fin having a center portion 30 and end portions (26, 32), wherein said center portion of said fin comprises a substantially non-conductive region (amorphous silicon-based dielectric) which is capable of permanently becoming a conductor when heated above a

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predetermined temperature, wherein said end portions comprise conductors. A "fin" is understood to be a projection that extends from a body and it is quite clear to the examiner that the antifuse structure (26, 30, 32) of Hsu is a projection from a body (22); therefore, the antifuse structure of Hsu is characterized as a fin.

Regarding claim 6, the end portions (26, 32) comprise silicide regions of the fin.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 7, 27-31, 33-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy (USPN 5,469,379).

Regarding claims 4, 30 and 37, Levy as described above does not teach the antifuse structure comprising a center portion having less than approximately 10 percent of the length of the fin. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the center portion having less than 10 percent of the length of the fin, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. In re Daily, 93 USPQ 47 (CCPA 1966), the court held that changes in size and shape of parts of an invention in the absence of an unexpected result involves routine skill in the art. Additionally, In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir.

1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Regarding claim 27, Levy does not expressly teach the antifuse structure comprising a fin having a height and length that exceeds a width of the fin. However, the rectangular structure (55, 58 and 60) as a fin obviously comprises a height, a length and a width, wherein a length by definition according to Merriam Webster's Collegiate Dictionary, tenth Edition is the longer or longest dimension of the object. Thus, a height and length (in combination) obviously exceeds a width of the fin (55, 58, 60). Furthermore, the relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claims 7, 33 and 34, Levy does not teach the antifuse structure comprising a fin having a height and length that exceeds more than 2 times a width of the fin. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the fin having a height and length (a combination) that exceeds more than 2 times a width of the fin, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. *In re Daily*, 93 USPQ 47 (CCPA 1966), the court held that changes in size

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and shape of parts of an invention in the absence of an unexpected result involves routine skill in the art. Additionally, In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Regarding claims 28 and 35, said center portion of said fin comprises an amorphous material.

Regarding claims 29 and 36, it is inherent that said center portion of said fin is approximately 10 times more conductive after being heated above said predetermined temperature when compared to conductivity level of said center portion before heating.

Regarding claims 31 and 38, the center portion comprises amorphous silicon before transforming into polycrystalline silicon.

The limitations "being heated above predetermined temperature" in claims 29, 31 36 and 38 are functional languages and are nonlimiting since it has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In *re Danley*, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims cover what a device is, not what a device does". *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990). A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be

employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). It is noted that a functional statement cannot serve to distinguish a claim, which is not a process claim, from a reference since it does not define any structure. This is particularly so where the functional statement is conditional in nature, as to a possibility that may or may not occur. In re Mason, 244 F.2d 733, 114 USPQ 127 (CCPA 1957). Also, the center portion (link 58) has the same material and is an antifuse layer, it is capable to perform the same function as claimed, to become a conductor after being heated above the predetermined temperature.

Claims 27, 32, 34 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. (USPN 5,166,556).

Regarding claim 27, Hsu as described above does not expressly teach the antifuse structure comprising a fin having a height and length that exceeds a width of the fin. However, the antifuse structure (26, 30, 32) as a fin obviously comprises a height, a length and a width, wherein a length by definition according to Merriam Webster's Collegiate Dictionary, tenth Edition is the longer or longest dimension of the object. Thus, a height and length (in combination) obviously exceeds a width of the fin (26, 30, 32). Furthermore, the relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Regarding claim 34, Hsu et al. as described above do not teach the antifuse structure comprising a fin having a height and length that exceeds more than 2 times a

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width of the fin. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to form the fin having a height and length that exceeds more than 2 times a width of the fin, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233. In re Daily, 93 USPQ 47 (CCPA 1966), the court held that changes in size and shape of parts of an invention in the absence of an unexpected result involves routine skill in the art. Additionally, In Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

Regarding claims 32 and 39, the end portions (26, 32) comprise silicide regions of the fin.

(10) Response to Argument

A. The rejection Based on Levy

With respect to claim 1, appellants state that the rejection is unreasonably broad with respect to the claim terminology. Appellants argue that the structure (55, 58, 60) of Levy is not formed in the shape of the fin. The examiner respectfully disagrees with the remark because a "fin" is understood to be a projection that extends from a body and it is quite clear to the examiner that the antifuse structure (layers 55,58,60) of Levy is a

projection from a body (substrate 54). Thus, Levy clearly discloses the antifuse structures of fin type as claimed. Furthermore, claims in a pending application should be given their broadest reasonable interpretation. In re Pearson, 181 USPQ 641 (CCPA 1974).

In response to appellants' argument that the references fail to show certain features of appellants' invention, it is noted that the features upon which appellants rely (i.e., a thin projection which can be rectangular that extends from a surface) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). It is also noted that the feature "a thin projection" upon which appellants rely is not defined anywhere in the specification. Thus, it is not clear how thin is considered "thin".

Furthermore, Appellants also admit that Levy appears to teach the antifuse structure comprising a square or flat rectangle, or a disk shaped structure (page 8 of the appeal brief). A rectangular structure (55, 58, 60) on the substrate (54) as shown by Figs. 2,3 clearly describes a projection (55, 58, 60) that extends from a surface (54), and the antifuse structure of Levy is also considered as a thin projection because the degree of "thin" is not expressly defined in the specification.

With respect to claim 27, Appellants state that there is no fin in Levy upon which one of ordinary skill in the art could discover optimal or workable ranges. The examiner respectfully disagrees with the remark because the rectangular structure (55, 58 and 60) of Levy as described above is a fin which obviously comprises a height, a length

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and a width, wherein a length by definition according to Merriam Webster's Collegiate Dictionary, tenth Edition is the longer or longest dimension of the object. Thus, a height and length (in combination) obviously exceeds a width of the fin (55, 58, 60).

Furthermore, the relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

The appellants do not provide evidence or technical reasoning to the contrary.

With respect to claim 34, Appellants state that there is no fin in Levy upon which one of ordinary skill in the art could discover optimal or workable ranges. The examiner respectfully disagrees with the remark because the rectangular structure (55, 58 and 60) of Levy as described above is a fin. The relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The appellants do not provide evidence or technical reasoning to the contrary.

In response to appellants' argument that the references fail to show certain features of appellants' invention (see first paragraph, page 10 of the brief), it is noted that the features upon which appellants rely (i.e., a fin structure where the end portions are typically parallel to one another and even collinear) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

In response to appellants' argument that the second limitation in independent claim 1 (see second paragraph, page 10 of the brief) is not a product by process limitation but an operating characteristic of the final structure, it is noted that a functional statement cannot serve to distinguish a claim, which is not a process claim, from a reference since it does not define any structure. This is particularly so where the functional statement is conditional in nature, as to a possibility that may or may not occur. *In re Mason*, 244, F.2d 733, 114 USPQ 127 (CCPA 1957).

With respect to dependent claims 2-5, 7, 28-31, 33 and 35-38, Appellants state that Levy does not disclose any form of fin. The examiner respectfully disagrees with the remark because the rectangular structure (55, 58 and 60) of Levy as described above is a fin.

B. The rejection Based on Hsu

With respect to claim 1, appellants state that the rejection is unreasonably broad with respect to the claim terminology. Appellants argue that the antifuse structure (26, 30, 32) of Hsu is not formed in the shape of the fin. The examiner respectfully disagrees with the remark because a "fin" is understood to be a projection that extends from a body and it is quite clear to the examiner that the antifuse structure (layers 26,30,32) of Hsu is a projection from a body (22). Thus, Hsu clearly discloses the antifuse structures of fin type as claimed. Furthermore, claims in a pending application should be given their broadest reasonable interpretation. *In re Pearson*, 181 USPQ 641 (CCPA 1974).

In response to appellants' argument that the references fail to show certain features of appellants' invention, it is noted that the features upon which appellants rely (i.e., a thin projection which can be rectangular that extends from a surface) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). It is also noted that the feature "a thin projection" upon which appellants rely is not defined anywhere in the specification. Thus, it is not clear how thin is considered "thin". Therefore, the antifuse structure of Hsu is also considered as a thin projection because the degree of "thin" is not expressly defined in the specification.

In response to appellants' argument that the three portions of the antifuse of Hsu are three distinct layers of materials and the structure of Hsu would not be operable as a fin, it is noted that the present invention also discloses the three portions of the antifuse comprising three distinct layers of materials (silicide 602, amorphous silicon 600, and silicide 604) as disclosed by Hsu. The claimed structure is not patentably distinguished from the prior art structure. Hsu discloses a fin; therefore, the antifuse structure of Hsu is operable as a fin.

With respect to claim 27, Appellants state that there is no fin in Hsu upon which one of ordinary skill in the art could discover optimal or workable ranges. The examiner respectfully disagrees with the remark because the structure (26, 30, 32) of Hsu as described above is a fin which obviously comprises a height, a length and a width, wherein a length by definition according to Merriam Webster's Collegiate Dictionary,

tenth Edition is the longer or longest dimension of the object. Thus, a height and length (in combination) obviously exceeds a width of the fin. Furthermore, the relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The appellants do not provide evidence or technical reasoning to the contrary.

With respect to claim 34, Appellants state that there is no fin in Hsu upon which one of ordinary skill in the art could discover optimal or workable ranges. The examiner respectfully disagrees with the remark because the structure (26, 30 and 32) of Hsu as described above is a fin. The relative dimensions of the fin as claimed would have been determinable by one of ordinary skill in the art through no more than routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). The appellants do not provide evidence or technical reasoning to the contrary.

In response to appellants' argument that the second limitation in independent claim 1 (see third paragraph, page 16 of the brief) is not a product by process limitation but an operating characteristic of the final structure, it is noted that a functional statement cannot serve to distinguish a claim, which is not a process claim, from a reference since it does not define any structure. This is particularly so where the functional statement is conditional in nature, as to a possibility that may or may not occur. *In re Mason*, 244, F.2d 733, 114 USPQ 127 (CCPA 1957).

With respect to dependent claims 6, 32 and 39, Appellants state that Hsu does not disclose any form of fin. The examiner respectfully disagrees with the remark because the structure (26, 30 and 32) of Hsu as described above is a fin.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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May 08, 2006

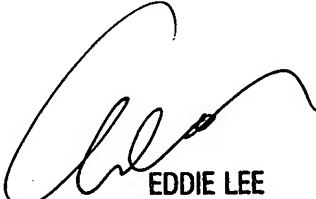

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